Operational genebank manual of IHAR National Centre for Plant Genetic Resources, Poland

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1. Germplasm Acquisition and Accessioning

Genebanks can obtain the germplasm they want to conserve through a number of different ways. Conducting collecting missions is possibly the best way of acquiring germplasm material in the most reliable manner. Germplasm exchange with other genebanks is a third route to add genetic diversity to the collection. Obtaining and storing germplasm from researchers and plant breeders is another route to acquire genetic material. Such acquisitions should be guided by a formal mandate that the genebank concludes with its host organization or government and that provides the basis for a genebank acquisition policy. The actual accessioning of acquired germplasm samples, i.e., formally including it into the collection with its unique accession number, is a complex process during which the curator has to check a number of aspects such as the verification of the identity of the material, the health status, the availability of pertinent information, etc. It is further understood that also legal aspects form part of this activity, e.g., was the material collected/obtained in legal manner, are there any restrictions on its use, etc.

Box 1.1. Germplasm Acquisition and Accessioning

GA1 – Briefly describe any formal mandate that your genebank might have concluded with or received from your "mother organization" (e.g. institute, governmental body).

This description should include details on:

a) *which species you conserve and make available;*
b) *who decides on what your mandate is and, if different,*
c) *from whom do you received the mandate;*
d) *the main aspects of the mandate; and*
e) *legal considerations on PGR as foreseen in national legislation.*

National Centre for Plant Genetic Resources under the research institute The Plant Breeding and Acclimatization Institute - National Research Institute (PBAI-NRI), conserves seeds of species considered as important for food and agriculture in Poland. Cooperating institutions conserve *in vitro* cultures, field collections (including tree species) and cryo collections.

The Plant Breeding and Acclimatization Institute (IHAR) is an institute supervised by the ministry of agriculture. The minister gave the statute of the Institute, which obliges National Centre for Plant Genetic Resources, as a department of IHAR, to:

- collecting populations and varieties of crops and wild plants threatened with genetic erosion,
- description and valorisation of collected materials,
- keeping samples of seeds in a living state and in genetic purity,
- documentation of collected materials, and exchange of samples with other genebanks and botanical gardens in the world,
- Providing initial materials to breeders of new varieties and research institutions,

- development of research and use of plant genetic resources,
- fulfilment of obligations resulting from international arrangements and actions for European integration in the context of PGR.

GA2 – Specific agreements. Does your genebank have any specific formal agreements with other genebanks regarding the conservation of specified germplasm?
This should include:

a) whether or not your genebank has any international agreements to conserve specified germplasm on behalf of other countries,
b) a specific region, and/or
c) the world, and
d) which crops or genepools fall under these agreements?

a) No.
b) No.
c) No.
d) None.

GA3 – In case your genebank has a germplasm acquisition policy, what does the policy entail?
Please specify which crops or which geographic area, if applicable.

There is a germplasm acquisition policy, which includes instructions on the following aspects: determining crops which are to be collected, informing specialists and curators about the collecting mission, deciding on the location and date of the collecting mission, preparation of lists and maps, germplasm collecting, minimum number of seeds, description of collected materials and transportation of samples.

GA4 – How do you verify the identity of the germplasm material received (e.g. relying on the donor's information, comparing material with other accessions, involving (taxonomic) expertise, etc.)?

When germplasm is obtained from researchers, plant breeders or other genebanks, we rely on information from the transferring party. In case of materials acquired during collecting missions, curators verify the identity of the material.

GA5 – Describe if and how you conduct an assessment of the various quality aspects of the seeds, tissue culture or plant material received.
This description includes:

a) quality aspects related to the correct identification of a given accession, but also
b) health
c) purity aspects of the sample/accession), and
d) use of a quality control system (e.g. ISO).

Visual evaluation of the sample quality. Only clean and healthy seeds are accepted for storage: the submitted samples are checked for infection, contamination with pests and weed seeds. International Rules for Seed Testing are applied.

GA6 – Describe whether and how the SMTA is being implemented:

a) extent of materials covered by SMTA (crops, numbers of accessions)
b) ways of SMTA implementation and documentation of transfers of PGR
c) other aspects (e.g. monitoring, supervision).

a) SMTA covers all accessions which are free of third-party rights, also species not included into Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture. Under SMTA 61 889 accessions are available which belong to 429 genera.
b) Preferred SMTA acceptance is click-wrap procedure used on ordering site https://wyszukiwarka.ihar.edu.pl/en. Signature option is also available. All SMTA information is stored in database or hard copy of signed SMTA document.
c) Monitoring is performed by case-by-case procedure. When user is asking about specific accessions we perform double check to update MLS accession status.

Box 1.2. Germplasm Collecting

GC1 – Describe here the details of the strategy that you follow in implementing germplasm collecting missions.

This description should include:

a) general aspects of planning and implementing a collecting mission,
b) the criteria you use for priority setting;
c) the actual strategy followed in sampling material from farmers' fields, from nature, etc.; and
d) how your germplasm acquisition policy underpins the mission.

a) Collecting missions are organized in the regions with the highest occurrence of local varieties, in the north-eastern, eastern and southern regions of Poland. To collect and register old varieties of fruit trees (orchards), mainly western and northern Poland is searched. The collection of ecotypes of grasses and small-seeded papilionaceous, CWRs and plants accompanying crops is being carried out throughout all country. In the face of the disappearance of local populations and varieties of arable crops in Poland, collecting missions have become the last chance to gather and secure material for the purposes of science and breeding. Therefore, the progress of genetic erosion was assessed during the expeditions every year, considering previously organized expeditions and collected material.

b) To collect material from local crop plant populations, collection missions are organized taken into account all regions of the country in which old varieties (landraces) of crops have been found in the previous missions. The main purpose of collecting PGR is to create collections that represent the widest possible genetic diversity of the gene pool of a given population. Mainly samples of "domesticated" species are collected, including local species and samples from old varieties of crops. In the last 20 years, apart from collecting crop's samples the collection of their accompanying species and crop wild relatives has been started. The last two groups of plants represent an element of the agricultural landscape. Most of the activities related to collections were carried out throughout the country. In the case of collecting missions abroad the activities were limited to neighbouring countries.

c) The collected seed needs to be sufficiently mature, therefore, the expedition dates should be in accordance with the time of seed maturation of given collected group of plant. Collecting missions are organized together with the curators of individual groups of plants, and the harvesting strategy is adapted to the target group of plants. Seeds, bulbs and grafts are collected, interviews with farmers are carried out. Passport data from each sample are collected, e.g.: how many years the given variety is grown, how it is used and where it comes from. The seeds are obtained mainly from the farmers' field or storage, but also bought at local marketplaces. Each collected sample receive its identification code, which consists of the three-letter code of the country where the expedition takes place, the first three letters of the region, two digits defining the year and after the space - the successive sample number, e.g.: POLKUR16 XXX. Previously the sample number was number preceded by abbreviation ”E”. In addition to the name of the country and region, the names of the village, host data, geographical coordinates, altitude are also recorded. Special collection form has been prepared. Part of collected material must be sent to the appropriate curator in order to characterize the given sample.

d) The expeditions are carried out in accordance with applicable regulations. The regulations regarding protected species are applied. Poland does not regulate access to native genetic resources.

GC2 – Provide any additional information on the germplasm collecting activities of your genebank, including the collaboration with others.

The curators of the collection, whose seed samples are in the genebank, receive information about the collecting missions organized in a given year, they could present their own travel proposals in advance. During the organization and implementation of these collecting missions, there is cooperation between various Institutes participating in the Plant Genetic Resources Programme, such as the Institute of Horticulture in Skierniewice, the Botanical Garden in Powsin, etc. In addition is maintained cooperation with the Forest Gene Bank in Kostrzyca, with the Gene Bank of the Czech Republic, with the Latvian Gene Bank and with the Estonian Gene Bank.

2. Ensuring Security

This chapter refers to the security of the genebank structure itself (i.e., its physical security), the safety of its germplasm (i.e., the maintenance of viability) as well as the institutional and personnel security, aspects which together will ensure the long-term conservation of the entire collection.

2.1. Physical Security

To ensure the physical security of the collections, the following aspects are regarded as essential elements for achieving the objective:

Box 2.1.1. Safety Duplication (of long-term conserved germplasm)

SD1 – Please describe how your genebank implements the safety duplication of your germplasm material.

This description should include the following aspects:

a) the type of safety duplication (e.g. black-box; no specific arrangement; other);
b) the location(s) where you store your safety-duplicates (country; genebank);
c) whether or not you are using a formal agreement with the genebank(s) that store your duplicates?
d) whether the safety-duplicates are stored under conditions comparable to your own? Please provide details;
e) do you maintain safety-duplicates from other genebanks at your genebank? If so, do you know any details of that material?

Seed accessions are stored as safety duplicates in Svalbard Global Seed Vault More than 11 000 accessions have been deposited in the Svalbard Global Seed Vault for now. A formal agreement between the Norwegian Ministry for Agriculture and Food and IHAR was signed in 2019. Since then, safety duplicates have been sent every year. Safety duplicates are stored there under conditions comparable to our base collection (-18 ℃).
We do not maintain safety-duplicates from other genebanks at our genebank.

SD2 – Do you have a safety duplication policy? If so, please provide essential details.

n.a.

Box 2.1.2. Structure

SS1 – Please provide details on how your genebank building has been designed to resist natural disasters (e.g. earthquakes; flood; storm).

The building is not specially adapted to natural disasters due to the low risk of these phenomena. Genebank is located in region not threatened by floods or earthquake.

SS2 – Please describe the security arrangements that you have in place to protect your genebank against burglars, fire and others.

Please include details on the following arrangements, as applicable:

a) fences;
b) security doors;
c) alarm system;
d) fire detectors;
e) standby generator;
f) others (please specify).

a) Fenced institute with safeguard, CCTV on the genebank building and surroundings.
b) Door with access control granted by the storage manager.
c) Alarm "man in cold-room" in the storage chambers released by personnel in the case of emergency, CO_2 leak alarm (CO_2 is a refrigerant used in the cooling installation of the active collection).
d) Fire alarm system in each chamber, as well in all genebank operational area.
e) Power generator driven by a diesel engine, emergency power supply up to 24 hours.

SS3 – Please provide information on any other structural security aspects that you might have in place.

n.a.

Box 2.1.3. Security Equipment

SE1 – Provide details on the kind of emergency (back-up) equipment or arrangements that you have in place to ensure permanent electricity and cooling.

Aspects to consider are:

a) *"back-up" compressors for your cold rooms;*
b) *generator;*
c) *regular maintenance and trial runs;*
d) *other*.

a) Each of the three chambers of the base collection has two independent refrigeration installations covering 100% of the cooling demand each. There is one, central installation for active collection but with double coolers in each chamber.
b) Power generator driven by a diesel engine, emergency power supply up to 24 hours.
c) The installations are regularly inspected.

SE2 – Describe how you monitor temperature and relative humidity in your cold stores and drying room.

The temperature and humidity in the storage and drying room is monitored by the refrigeration control system, and the data is recorded in history.

Box 2.1.4. Institutional and Personnel Security

IPS1 – Provide details on the "institutional security", in particular with respect to the provision of financial means to operate the genebank

Aspects to consider are:

a) *timely transfer of funds from the "mother" organization to the genebank;*
b) *do you have direct access to the "mother" organization that provides the budget?;*
c) *internal "security" of accessing these funds;*
d) *long-term security and stability of funding (compensation of inflation rates, avoiding variation in years)*
e) *any other observations that are relevant in this context*.

Since 2008, funding from the Ministry of Agriculture and Rural Development as part of a multi-annual program. Break in 2014 until mid-2015, special financing granted for the maintenance of genetic resources, as well in 2021.

IPS2 – Describe how you secure adequate staffing of your genebank.

The cost of staffing in 2015-2020 has been covered in 100% by a multi-annual programme and since 2021 directly by the state budget.

Box 2.1.5. Contingency Plans

CP1 – Describe the kind of emergency or contingency plan that your genebank has in place to cope with disaster situations.

n.a.

CP2 – Provide information on the kind of training, security drills and other activities that your genebank gives to its staff to deal with emergency situations, if any.

Lack of regular genebank-specific training, but there are periodic occupational health and safety trainings.

3. Germplasm Maintenance

This chapter deals with key aspects of managing germplasm in a genebank, i.e. the maintenance of the viability, the genetic integrity, the availability of the conserved germplasm as well as the management of the corresponding information.

3.1. Maintenance of Viability

This section refers to the maintenance of the longevity of the seeds or of tissue cultures or living plants in storage. A high initial viability is the most important pre-condition for achieving the longest lifespan of seed accessions in storage, hence maximum efforts need to be taken to ensure that seeds to be stored have the highest possible viability. Optimum growing conditions when multiplying/regenerating the accessions, efficient management of the preparatory steps before storing the germplasm, adequate storage conditions as well as proper monitoring of the viability are critically important.

A. Seed Collections

Box 3.1.1.A. Initial seed viability

IV1 – Describe the procedures or practices that you have in place to ensure the highest possible initial viability of your seed, in particular during regeneration and post-harvest (e.g. cultivation practices, pollination aspects, use of specific equipment as shelters, storage of harvested seeds, cleaning, etc.).

[This task is carried out by the curators of the collections, according to relevant procedures]

IV2 – Describe procedures how you deal with a) dormancy and b) hard seeds.

a) The seeds dormancy is broken according to the ISTA methodology, depending on the species (KNO_3 addition, heating, cooling).
b) hard seeds are treated according to the ISTA methodology.

IV3 – Please provide any other information on procedures that you follow to ensure highest possible initial viability.
n.a.

Box 3.1.2.A. Seed Viability Monitoring

VM1 – Describe the routine seed viability monitoring system that you use.
The monitoring system should include the following aspects:

a) frequency of testing;
b) sampling method applied;
c) any thresholds that you use;
d) whether you apply different procedures for crops/species with erratic initial viability or irregular viability lifespan;

e) *etc*.

a) every 5 to 10 years.
b) 25 seeds in 3 repetitions.
c) regeneration if the viability is lower than 80%.
d) Threshold for grasses regeneration is lower, regeneration decision is made by relevant curator.

VM2 – Please describe the information "system" that you might have in place that allows you to make more species- or even accession-specific decisions regarding when the next monitoring should take place.
n.a.

VM3 – Please provide information on non-specific thresholds that you might use for viability of seeds (i.e. percentage of germination) and for the amount of seeds left of an accession to initiate regeneration. *In case you differentiate between self- and outbreeding species, please answer for each category separately.*

Regeneration if the viability is lower than 80%. Threshold for grasses regeneration is lower, regeneration decision is made by curator. Quantity of seeds is determined visually. Objects are directed to regeneration if the volume of seeds has fallen to about 1/4 of the volume of the jar.

Box 3.1.3.A. Seed Storage Conditions (for the different types of collections, i.e. short/medium- or long-term storage)

SC1 – Please provide details on temperature and relative humidity conditions of your storage and drying rooms. In case they vary from room to room, please provide details for each.

1. Active collection – temperature +1 °C, base collection – t. -18 °C; drying room – 15% RH, t. +20 °C; Humidity in the collections chambers is not regulated, but is monitored.

SC2 – Provide details on the type of containers and the packaging procedures (and the corresponding equipment, if any) that you use.

Active collection – jars with twist-off lid, capacity 0,9 L; in the approx. 95% vacuum closed jars, there are Absorgel Pouch HIP bags with humidity indicator, filled with 2 g of desiccant- calcium chloride.
Base collection – three-layer aluminium foil bags (PET 12 µm/Al 8 µm/PE 100 µm), welded, vacuum-sealed (vacuum approx. 95%).

SC3 – What is the range of seed moisture contents (smc) of your stored seeds of different species; what measures do you apply to keep and/or monitor the (low) moisture level? Do you treat different species differently?

Depends on the species, in the range of 5-10%.

SC4 – Provide data on the total storage capacity (number of containers, number of accessions) and an estimated percentage to which extent this capacity has been filled.

5 cold rooms with a total capacity of approx. 500 m^3, fulfilment approx. 70%;
3 freezing chambers – capacity ca. 300 m^3, approx. 5% full.

SC5 – Please include any other aspects regarding storage conditions at your genebank that you regard as important (e.g. anticipated lifespan of freezing and drying equipment and related prudent financial management).

Estimated cooling system operation time: 20 years.

B. *in vitro* Culture Collections

Box 3.1.1.B. Initial viability

IV1 – Describe the procedures or practices that you have in place to ensure the highest possible initial viability of your plant material, in particular during culture of donor plants (e.g. cultivation practices [field, greenhouse], phytosanitary pre-treatments, like use of pesticides).

IV2 – Describe procedures of explant isolation (organ source in the plant, manipulations) and sterilization (chemical and handling) of the explants.

IV3 – Please provide any other information on procedures that you follow to ensure highest possible initial viability.

Box 3.1.2.B. Viability Monitoring

VM1 – Describe the routine *in vitro* viability monitoring system that you use.

The monitoring system should include the following aspects:

a) *regular control of contamination events,*
b) *control of hyper-hydricity,*
c) *control of health state (if different from a above),*
d) *etc*.

Box 3.1.3.B. Storage Conditions (for the different types of collections i.e. short/medium- or long-term storage)

SC1 – Please provide details on light, temperature and relative humidity conditions of your culture and storage rooms, as applicable. In case they vary from room to room, please provide details for each.

SC2 – Provide details on the type of cultivation vessels (tubes, jars, plastic vessels etc.) and the transfer procedures (including the corresponding equipment, if any) that you use.

SC3 – Please include any other aspects regarding *in vitro* culture and storage conditions at your genebank that you regard as important.

C. Cryopreserved Collections

Box 3.1.1.C. Initial viability

IV1 – Describe the procedures or practices that you have in place to ensure the highest possible initial viability of your cryopreservation explant (source: *in vitro* pre-culture or directly from *in situ* explants), sterilization and explant isolation.

IV2 – Please provide any other information on procedures that you follow to ensure highest possible initial viability (e.g. elimination of virus diseases).

Box 3.1.2.C. Viability Monitoring

VM1 – Please indicate whether (and if so when and how) you perform random viability tests after the initial viability test [see also VM3 below].

VM2 – Please describe the information "system" that you might have in place that allows you to make more species- or even accession-specific decisions.

VM3 – Indicate for the initial regeneration control:

a. what is the percentage of regenerated control explants relative to the total number of explants per accession;
b. any thresholds that you use [e.g. discard the material as not storable below a certain regeneration rate of the control];
c. whether you apply different procedures for accessions with erratic regeneration rates of the control [e.g. increase the amount of explants stored]; and
d. what is the threshold number of remaining explants of a given accession under which you initiate regeneration for multiplication.

Box 3.1.3.C. Storage Conditions (for the different types of collections i.e. short/medium- or long-term storage)
SC1 – Please provide information on the general system used for cryopreservation (liquid nitrogen or vapour phase, automatic tank filling or filling by hand). In case they vary from tank to tank, please provide details for each. **SC2** – Provide details on the type of cryopreservation tanks and storage system within the tank that you use. **SC3** – Do you treat different species differently? **SC4** – Please include any other aspects regarding storage conditions at your genebank that you regard as important.

D. Field Genebank Collections

Box 3.1.1.D. Initial viability

IV1 – Describe the procedures or practices that you have in place to ensure the highest possible quality of your planting material, in particular during the growing from donor plants (e.g. cultivation practices in the field or greenhouse, phytosanitary pre-treatments, etc.).

IV2 – Describe any particular procedures you use (e.g. which organ of the donor plant you use to reproduce the planting material).

IV3 – Please provide any other information on procedures that you follow to ensure highest possible initial quality.

Box 3.1.2.D. Viability Monitoring

VM1 – Describe the routine field genebank monitoring system that you use.
The monitoring system could include the following aspects: regular control of disease or pest contamination, other types of damages to the plants, etc.

VM2 – Describe the information "system" that you might have in place that allows you to make more species- or even accession-specific decisions regarding when the next monitoring should take place.

VM3 – Please provide information on non-specific thresholds that you might use for the quality of the individual plants (e.g. loss by weak growth) and for the amount of plants of an accession left in the field before additional initiating multiplication measures.

Box 3.1.3.D. Maintenance Conditions

SC1 – Please provide details on your cultural practices (e.g. cultivation practices; pruning; irrigation; protection against animals, etc.; pest and disease management; etc. applied to your field genebank material.

SC2 – In the case of annual or sub-perennial species that cannot over-winter in the field genebank, what measures do you take?

SC3 – Please include any other aspects regarding field genebank maintenance conditions at your genebank that you regard as important.

3.2. Maintaining Genetic Integrity

Maintaining the genetic integrity of an accession can be achieved by minimizing genetic drift which may occur predominantly during the process of regeneration, due to too small numbers of individuals being planted, sub-optimal pollination and/or the introgression of alleles from other accessions or commercial crops or crop wild relatives. The following aspects are important for achieving the objectives of maintaining genetic integrity and should be briefly described. Please note that a distinction should be made between seed numbers for an accession and seed numbers for sub-samples per accession. The latter only applies if the seeds of a given accession are being stored and distributed as sub-samples. As genetically modified material gets more widely distributed and as it might have specific (legal, technical, administrative) requirements, a separate box on this type of material is included.

For *in vitro* cultured and cryopreserved material, which are normally maintained as clones, genetic stability is as important as genetic integrity of the seed-stored material.

A. Seed Collections

Box 3.2.1.A. Seed Containers and Sample Size

SCSS1 – Do you document the initial number of seeds of individual accessions (either as received from collecting missions or through exchange)?

Yes, but not the exact number of pieces. The number of seeds is assessed visually.

SCSS2 – Please describe what kind of containers (and equipment) you use, the procedure you follow with respect to sub-sampling, seed numbers per container, etc.

Active collection – jars with twist-off lid, capacity 0,9 L; in the approx. 95% vacuum closed jars, there are Absorgel Pouch HIP bags with humidity indicator, filled with 2 g of desiccant - calcium chloride.
Base collection – three-layer aluminium foil bags (PET 12 µm/Al 8 µm/PE 100 µm), welded, vacuum-sealed (vacuum approx. 95%).

SCSS3 – What is the number of seeds that you use as the minimum threshold per accession? Are these seed numbers of a given accession based on genetic parameters (such as reproduction biology; heterogeneous samples)? Please provide URL of your protocols if these are available online.

There is procedure, but not available online. Quantity of seeds is determined visually. Objects are directed to regeneration if the volume of seeds has fallen to about 1/4 of the volume of the jar.

SCSS4 – Please provide details on other aspects that are important in this context.

n.a.

Box 3.2.2.A. Pollination Control

PC1 – Please describe the regeneration procedures that you follow for self- and outbreeding species.

Please include in your description the following aspects:

a. *any control measures to minimize or avoid cross-pollination between accessions;*
b. *the use of pollination cages for insect-pollinated species;*
c. *the use of specific pollinators for insect-pollinated species;*
d. *strategies to ensure that males and females participate equally in the reproduction*;
e. *strategies to avoid any genetic drift (minimum number of plants, minimum number of plants at flowering stage before pollinators introduction, similar quantity of seeds harvested from each plant, etc.*

a. for cross-pollinated species mechanical or distance isolation is used eg. rye Secale
b. Buckwheat collection is regenerated under tents where pollinators are used.
c. Buckwheat collection is regenerated with Fly as a pollinator.
d. n.a.
e. n.a.

PC2 – Provide any other relevant information on procedures that you apply to control pollination of your germplasm.

n.a.

Box 3.2.3.A. Regeneration Environment and Procedures

RE1 – Describe the regeneration environment and conditions that you apply. If applicable, you might want to distinguish between different types of germplasm (e.g. wild relatives, landraces, modern varieties, breeding material, genetic stocks, etc.).
Consider the following aspects:

a) *in how far are the environmental conditions of the current regeneration of individual germplasm accessions comparable to the environmental conditions that existed at the original collecting or breeding site?*
b) *do you use controlled environments?*
c) *do you collaborate with other genebanks in Europe?*
d) *others*.

Regeneration of germplasm is performed by the curators – crop specialists, who work in institutions placed throughout the country. Therefore, regeneration environment differentiates between the collections (e.g., wheat, barley, bean) because of different locations of facilities, but does not differentiate between different types of germplasm (wild relatives, landraces, breeding material etc.).

RE2 – Please include any other relevant points on regeneration environment.

n.a.

Box 3.2.4.A. Seed Processing Procedures

SPP1 – Describe the protocol(s) that you use for threshing and seed cleaning.

Seeds are cleaned manually.

SPP2 – Describe the protocol(s) that you use for seed drying, including whether you use different drying procedures for different types of species.

The same procedure for all species. Drying time depends on the species. Drying in canvas/cotton bags on wire baskets-shelves in a drying room under constant conditions (15% RH, 20 °C).

SPP3 – Please describe how you keep the time between harvesting and the actual (long-term) storage of seeds as short as possible.

Reducing the drying time to the necessary minimum.

SPP4 – Please describe how and where you store (in a temporary manner) newly harvested seeds.
Please provide details on the temperature and relative humidity of the storage room/space; what type of containers do you use, if any.

Room temperature and humidity, cotton bags with double labels

SPP5 – Describe the criteria you use to decide on seed quantity per accession for the long-term storage.

Minimum 500 seeds for base collection, 1.500 seeds for active collection. Optimum number of seeds varies between 5.000-20.000.

Box 3.2.5.A. Genetically Modified Material
GMM1 – In case you treat GMO material differently from “normal germplasm”, please provide here the details for each of the deviating procedures (and equipment). n.a. **GMM2** – Describe the policy and procedures (if any) in your genebank, related to ensuring that distributed samples are not containing GMOs. n.a.

B. *in vitro* Culture Collections

Box 3.2.1.B. *in vitro* Culture Vessels and Sample Size
SCSS1 – Indicate if you document the initial number of explants of individual accessions when culture is initiated (from one or from more clonal donor plants). **SCSS2** – Please describe in general terms the type of culture vessels (as far as not already done in section SC2 in Box 3.1.3.B), media and phytohormones you use, as well as the procedures you follow with respect to cutting technique, callus exclusion, etc. **SCSS3** – Please indicate whether or not you use a minimum number of *in vitro* plantlets per accession. **SCSS4** – Please provide details on other aspects that are important in this context.

Box 3.2.2.B. *in vitro* Culture Procedures
SPP1 – Describe the numbers of sub-clones you may cultivate per accession (assuming that this is not crop-specific). **SPP2** – Describe the sub-culture duration (if not crop-specific)

Box 3.2.3.B. Genetically Modified Material

GMM1 – In case you treat GMO material differently from “normal germplasm”, please provide here the details for each of the deviating procedures (and equipment).

C. Cryopreserved Collections

Box 3.2.1.C. Cryopreservation Containers and Sample Size

SCSS1 – Indicate if you document the initial number of explants of individual accessions.

SCSS2 – Please describe what kind of cryopreservation vessels (and equipment) you use (only if they differ from the corresponding answers in previous boxes), the procedure you follow with respect to separate material containing viruses or bacteria from healthy material.

SCSS3 – What is the number of explants that you use as the minimum threshold per accession?

SCSS4 – Please provide details on other aspects that are important in this context.

Box 3.2.2.C. Cryopreservation Procedures (as long as not crop-specific)

SPP1 – Describe the protocol(s) that you use for pre-culture and pre-treatment such as cold acclimation and dehydration.

SPP2 – Describe the protocol(s) that you use for cryopreservation proper (such as slow freezing, droplet freezing, vitrification, encapsulation, etc.).

SPP3 – Describe the protocols that you use for regeneration (slow or fast rewarming, washing, dark periods, etc.).

SPP4 – Describe the time span and method(s) of survival and regeneration controls.

SPP5 – Describe the criteria you use to decide on explant quantity per accession for the long-term storage.

Box 3.2.3.C. Genetically Modified Material

GMM1 – In case you treat GMO material differently from “normal germplasm”, please provide here the details for each of the deviating procedures (and equipment).

D. Field Genebank Collections

Box 3.2.1.D. Accession Sample Size

SCSS1 – Indicate if you document the initial number of plants of individual accessions (either as received from collecting missions or through exchange).

SCSS2 – Please describe what kind of procedures you follow, if any, with respect to sub-sampling and subsequent place/container/etc. of maintenance.

SCSS3 – What is the number of plants that you use as the minimum threshold per accession? Are these plant numbers of a given accession based on genetic parameters (such as reproduction biology; heterogeneous samples)?

SCSS4 – Please provide details on other aspects that are important in this context.

Box 3.2.2.D. Multiplication

PC1 – Please describe the multiplication procedures that you follow for your field genebank material (both annual and perennial species)

Please include in your description the following aspects if they would apply to your field genebank management procedures):

a. *any control measures to minimize or avoid cross-pollination between accessions (if applicable/relevant);*
b. *the use of pollination cages for insect-pollinated species;*
c. *the use of specific pollinators for insect-pollinated species;*
d. *strategies to ensure that males and females participate equally in the reproduction*);
e. *strategies to avoid any genetic drift (minimum number of plants, minimum number of plants at flowering stage before pollinators introduction, similar quantity of seeds harvested from each plant, etc.).*

PC2 – Provide any other relevant information on procedures that you apply to control pollination of your germplasm in case of harvesting planting material from your field genebank material.

Box 3.2.3.D. Planting Material Processing Procedures

SPP1 – Describe the protocol(s) that you use for threshing and seed cleaning, if used as an intermediate step for the management/multiplication of your field genebank accessions.

SPP2 – Please describe how and where you store (in a temporary manner) newly harvested planting material.
Please provide details on the temperature and relative humidity of the storage room/space; what type of containers you use, if any, etc.

SPP3 – Describe the criteria you use to decide on the number of plants per accession intended for the long-term conservation.

3.3. Ensuring Availability

An important objective of conservation efforts is to facilitate the effective utilization of germplasm accessions by researchers, breeders and farmers. Thus, ensuring the ready availability of stored germplasm is an important principle. It refers to the ability of genebanks to supply and distribute the stored germplasm, together with any associated information, in an adequate way to users. Aspects that can affect the availability include: (a) policies, (b) seed stock, (c) health status of accessions, and (d) distribution quantity.

A. Seed Collections

Box 3.3.1.A. Ensuring Availability of Germplasm – Policy Aspects

AGP1 – Describe the germplasm distribution policy that you follow at your genebank.
You might want to consider in your response the following aspects:

a) crop/species specificity;
b) whether or not sufficient seed stock is available; who the requestor is;
c) what the purpose of the germplasm request is;
d) any restrictive conditions and/or
e) the total amount of accessions sent per request for distribution of germplasm;
f) use of a formal agreement to distribute the germplasm.

a) We distribute 50 seeds of each accession regardless of the variety.
b) When seed stock is insufficient, seeds are not distributed. Whoever the requestor is, they obtain samples under the same conditions and in the same quantity.
c) Requestor can order seeds for research, breeding and education purposes under SMTA. International requestors can order the material only under SMTA.
d) n.a.
e) There is a limit of 50 accessions per order, 10 orders per year per person/institution.
f) The following agreement is used to distribute the germplasm: SMTA (in all cases, also internationally).

AGP2 – Do you have as part of your service-rendering policy aspects such as a "maximum time" between receiving a germplasm request and distribution of the germplasm

No.

AGP3 – Describe how you treat "related information" about the requested accessions that you make available to the requestor, i.e. provide details on the typical information you send out with the germplasm.

We do not distribute any information together with the germplasm unless requested. All passport data, evaluation data, photographs and documents attached to accessions are publicly available at https://wyszukiwarka.ihar.edu.pl/en/.
The requestor receives germplasm with basic information such as accession number, genus and species name.

Box 3.3.2.A. Ensuring Availability of Germplasm – Seed/Germplasm Stock Aspects

AGSS1 – Please provide details on the minimum/maximum amount of seed, plant, *in vitro* samples that you distribute (where relevant, differentiated by species groups, i.e. self-pollinating, cross-pollinating and/or whether an accession is homo- or heterogeneous).

As a rule, 50 seeds, on special request more or less, but only if it is possible.

AGSS2 – Describe how you store the seeds/other germplasm of a given accession with respect to the use of single or multiple bags or containers per accession.

Each accession is kept in single packaging (jar for active collection, three-layer bag for base collection). In case of large seeds each accession is packed in two jars/bags. After regeneration, new generation packed in small bag is placed into the same jar.

AGSS3 – Describe how you manage the availability of adequate seed/other germplasm stock per accession, including the use of an absolute lower minimum of seeds per accession as the threshold to decide to regenerate.

The number of seeds is verified during viability test or distribution process. Accession is multiplicated when necessary.

AGSS4 – Provide here information on any other aspects that are relevant to manage seed/other germplasm stocks.

n.a.

Box 3.3.3.A. Ensuring Availability of Germplasm – Health Aspects

AGHA1 – Describe how you store seed/other germplasm with respect to germplasm health considerations, including whether you have a "policy" of storing only "disease-free" (as far as you can see or determine) accessions, at least for the quarantine pests and diseases.

There is special procedure , seeds are cleaned manually and visual quality check is performed.

AGHA2 – Describe how you follow plant quarantine rules and regulations when exporting germplasm abroad (especially to countries at another continent).

We stick to the phytosanitary regulation. Phytosanitary certificate is obtained when it is required.

AGHA3 – Describe if and how you distribute germplasm accompanied by a phytosanitary certificate or a "plant passport".

No specific rules, phytosanitary certificate or import permission is attached.

AGHA4 – Provide any other relevant information on procedures that you follow with respect to germplasm health aspects.

n.a.

Box 3.3.4.A. Germplasm Supply

GS1 – Describe the policy of your genebank with respect to the sample size that you use for distribution purposes, including whether you differentiate between germplasm from self- or outbreeding species, heterogeneous accessions, and possibly other aspects.

As a rule, 50 seeds, on special request more if it is possible.

GS2 – As GS1 above, but in case your germplasm samples do not possess the minimum viability, would you increase the number of seeds?

No.

GS3 – Please provide information on any other aspects related to seed supply.

n.a.

B. *In vitro* Culture Collections

Box 3.3.1.B. Ensuring Availability of Germplasm – Policy Aspects
AGP1 – Describe the germplasm distribution policy that you follow at your genebank. *You might want to consider in your response the following aspects: is the user informed about the option to get provided with* in vitro *cultures and whether they are available all the time of the year; are* in vitro *samples an option or the only way to get material; who the requestor is; what the purpose of the germplasm request is; any restrictive conditions and/or the total amount of accessions sent per request for distribution of germplasm; use of a formal agreement to distribute the germplasm.*

AGP2 – Indicate if you have as part of your service-rendering policy aspects such as a “regular or a maximum time” between receiving a germplasm request and distribution of the germplasm.

AGP3 – Describe how you treat “related information” about the requested accessions that you make available to the requestor, i.e. provide details on the typical information you send out with the germplasm.

Box 3.3.2.B. Ensuring Availability of Germplasm – Germplasm Stock Aspects

AGSS1 – Please provide details on the maximum amount of *in vitro* samples that you distribute.

AGSS2 – Describe how you store the samples of a given accession with respect to the use of vessels for culture and vessels for distributions (glasses of plastic bags).

AGSS3 – Describe how you manage the availability of adequate plants per accession, including the use of an absolute lowest minimum of plants per accession as the threshold to decide to regenerate.

AGSS4 – Provide here information on any other aspects that are relevant to manage stocks (e.g. transfer of material through greenhouse transfer phases in case a user cannot handle *in vitro* cultures).

Box 3.3.3.B. Ensuring Availability of Germplasm – Health Aspects

AGHA1 – Describe how you store germplasm with respect to germplasm health considerations, including whether you have a “policy” of storing only “disease-free” (as far as you can see or determine) accessions, at least for the quarantine pests and diseases.

AGHA2 – Describe how you follow plant quarantine rules and regulations when exporting germplasm abroad (especially to countries at another continent).

AGHA3 – Describe if and how you distribute germplasm accompanied by a phytosanitary certificate or a “plant passport”.

AGHA4 – Provide any other relevant information on procedures that you follow with respect to germplasm health aspects.

Box 3.3.4.B. Germplasm Supply

GS1 – Describe the policy of your genebank with respect to the sample size that you

GS2 – Please provide details of your routine methodology of containers etc. that you use to distribute *in vitro* cultures.

GS3 – Please provide information on any other aspects related to *in vitro* plant supply.

C. Cryopreserved Collections

Box 3.3.1.C. Ensuring Availability of Germplasm – Policy Aspects

AGP1 – Describe the germplasm distribution policy that you follow at your genebank. *Cryopreserved material is for distribution in exclusive cases only – e.g. for special research, please describe your policy*; *who the requestor is; what the purpose of the germplasm request is; any restrictive conditions and/or the total amount of accessions sent per request for distribution of germplasm; use of a formal agreement to distribute the germplasm*.

AGP2 – Indicate if you have as part of your service-rendering policy aspects such as a "regular or maximum time" between receiving a germplasm request and distribution of the germplasm.

AGP3 – Describe how you treat "related information" about the requested accessions that you make available to the requestor, i.e. provide details on the typical information you send out with the germplasm.

Box 3.3.2.C. Ensuring Availability of Germplasm – Germplasm Stock Aspects

AGSS1 – Please provide details on samples that you distribute (where relevant).

AGSS2 – Describe how you store, for distribution, the cryopreserved material of a given accession with respect to the use of special equipment such as dry-shippers etc.

AGSS3 – Describe how you manage the availability of adequate cryopreserved material.

AGSS4 – Provide here information on any other aspects that are relevant to manage seed/other germplasm stocks.

Box 3.3.3.C. Ensuring Availability of Germplasm – Health Aspects

AGHA1 – Describe how you store seed/other germplasm with respect to germplasm health considerations, including whether you have a “policy” of storing only “disease-free” (as far as you can see or determine) accessions, at least for the quarantine pests and diseases. You could also add data on separation of differently infested material in separate cryotanks, etc.

AGHA2 – Describe how you follow plant quarantine rules and regulations when exporting germplasm abroad (especially to countries at another continent).

AGHA3 – Describe if and how you distribute germplasm accompanied by a phytosanitary certificate or a “plant passport”.

AGHA4 – Provide any other relevant information on procedures that you follow with respect to germplasm health aspects

Box 3.3.4.C. Germplasm Supply

GS1 – Describe the policy of your genebank with respect to the sample size that you use for distribution purposes.

GS2 – Please provide details of your routine methodology of containers etc. that you use to distribute cryopreserved material.

GS3 – Please provide information on any other aspects related to cryopreserved material supply.

D. Field Genebank Collections

Box 3.3.1.D. Ensuring Availability of Germplasm – Policy Aspects

AGP1 – Describe the germplasm distribution policy that you follow at your genebank. *You might want to consider in your response the following aspects: crop/species specificity; whether or not sufficient seed stock is available; who the requestor is; what the purpose of the germplasm request is; any restrictive conditions and/or the total amount of accessions sent per request for distribution of germplasm; use of a formal agreement to distribute the germplasm*.

AGP2 – Indicate if you have as part of your service-rendering policy aspects such as a "maximum time" between receiving a germplasm request and distribution of the germplasm.

AGP3 – Describe how you treat "related information" about the requested accessions that you make available to the requestor, i.e. provide details on the typical information you send out with the germplasm.

Box 3.3.2.D. Ensuring Availability of Germplasm – Seed/Germplasm Stock Aspects

AGSS1 – Please provide details on the minimum/maximum amount of plants or organs (cuttings, bulbs, tubers, etc.) per plant that you distribute per accession (where relevant, differentiated by species groups, i.e. annual or perennial; woody or herbaceous; other) and/or whether an accession is clonally or sexually propagated).

AGSS3 – Provide here information on any other aspects that are relevant to manage plant material stocks.

Box 3.3.3.D. Ensuring Availability of Germplasm – Health Aspects

AGHA1 – Describe how you maintain field genebank (and any intermediate storage step) accessions with respect to health considerations, including whether you have a "policy" on accepting/planting only "disease-free" planting material (as far as you can see or determine) accessions, at least for the quarantine pests and diseases.

AGHA2 – Describe how you follow plant quarantine rules and regulations when exporting germplasm abroad (especially to countries at another continent).

AGHA3 – Describe if and how you distribute germplasm accompanied by a phytosanitary certificate or a "plant passport".

AGHA4 – Provide any other relevant information on procedures that you follow with respect to germplasm health aspects.

Box 3.3.4.D. Germplasm Supply

GS1 – Describe the policy of your genebank with respect to the sample size that you use for distribution purposes, including whether you differentiate between germplasm from annual or perennial species, clonally or sexually propagated accessions, and possibly other aspects.

GS2 – Please provide information on any other aspects related to seed supply.

4. Providing Information

The lack of adequate information on a given accession may well decrease the value of that accession to the user. The information on individual accessions should be as complete as possible in order to facilitate the identification of duplicates and/or to select accessions with desirable characteristics. A genebank should have a documentation system in place that allows to optimize management of the collections as well as to provide access to information about the collection to users.

Box 4.1. Genebank Documentation System

GD1 – Please provide details on the technical aspects of the genebank information management system(s) that you use.

a) On which software is the system based (i.e. Oracle, Fox Pro, MS Access, MS excel, MS Word, other?).
b) In case you use a manual information management system, please provide details.
c) In case your "internal" database(s) is/are different from the publicly available database(s), please provide details on both,
d) Describe which activities of the genebank are covered by the system.

a) The genebank information management system is based on MS SQL 2008.
b) n.a.
c) There are only a few types of data publicly available: passport data, evaluation data, photographs and documents attached to accessions. Data is available on the website of the National Centre for Plant Genetic Resources: Polish Genebank: https://wyszukiwarka.ihar.edu.pl/en/. The internal database contains numerous modules and requires granting access by an administrator. Logged-in user can have full or restricted access to modules cited in paragraph below.
d) The system covers almost all operations carried out in the genebank and is divided into numerous modules:
- a list of institutions and curators responsible for certain genus, species or plant group,
- information of genebank accessions (including field collections, *in vitro*, cryopreservation) such as: passport data, evaluation data, availability, curator, plant group, collecting missions' data, photographs, documents attached to accessions,
- history of accessions, sample weight, thousand kernels weight, sample size,
- date of placing accessions in the drying room, date of the end of drying,
- accessions' location (only for seeds in the long-term storage, collection type (active/base collection),
- index of accessions sent to the curators that perform regeneration and multiplication along with information of the reason of such need (e.g., low quantity of seeds), date of shipping and return date,
- germination tests results,
- taxonomy and common Polish and English names for taxa ,
- reference collection (herbarium) database including taxonomic data, accession type and unique object number. When one accession is

maintained long-term and has a reference in herbarium, the records are connected,
- distribution data, order date, realisation date, type of agreement (SMTA, HOBBY, Agriculture special program).

GD2 – Provide details on which types of data you handle in your documentation system, e.g. passport data, characterization & evaluation data, cultivar data, material distribution, etc.

Described in paragraph GD1d.

GD3 – In case your internal database(s) is/are different from the publicly available database(s), please provide details on both.

Publicly available database is in fact an ordering system that features passport data, evaluation data, photographs and documents attached to accessions. It is accessible through the website https://wyszukiwarka.ihar.edu.pl/en.
Internal database covers almost all operations carried out in the genebank and is divided into numerous modules (described in paragraph GD1d).

GD4 – Describe in which form you send accession specific data (e.g. as hard copy, electronically – if the latter, please specify (in plain text) which file format, i.e. Excel, Access, others is used).

We do not send accession specific data unless requested. All passport data, evaluation data, photographs and documents attached to accessions are publicly available at https://wyszukiwarka.ihar.edu.pl/en and it is possible to download data (passport data, evaluation data).

GD5 – Provide information on how technical support for development and maintenance of the documentation system is arranged**.**

Maintenance of documentation system is provided by the IT department of the Plant Breeding and Acclimatization Institute.
The documentation system is being expanded every year by external company.
Technical support and development of the documentation system is being financed from the state budget by the Ministry of Agriculture and Rural Development.

GD6 – Describe your genebank policy with respect to backing-up of the database contents, including with which frequency.

A full backup copy of the database is performed every 7 days.
Incremental backup is performed daily.

GD7 – Provide any other information on your information management system that is not covered in one of the above questions.

Ordering site https://wyszukiwarka.ihar.edu.pl/en provides functionality of:

- downloading passport and evaluation data as a .csv, .pdf, .txt, .xls files,
- link to the current search criteria or link to the single accession which can be easily shared.

For international users we use only SMTA agreement. Help site https://dokumentacja.ihar.edu.pl/ is connected to ordering site where user can find various information about ordering system.

Box 4.2. Information Exchange

IE1 – Please describe how you make your passport data available to users (i.e. as hard copy; via the internet; other?).

Passport data, along with evaluation data, photographs and documents attached to accessions are publicly available at https://wyszukiwarka.ihar.edu.pl/en/.

IE2 – Please indicate if your data is available as machine-to-machine web-services. In case it is, describe:

a. what types of data (passport data, characterization & evaluation data etc.) and
b. which web-service interfaces are available (i.e. GBIF IPT, BioCase, TapirLink).

IE3 – Please indicate if your data is published to EURISCO. Describe which data is published to EURISCO and at which intervals.

We upload to EURISCO the following data once a year:

- passport data of maintained seed accessions,
- passport data of accessions maintained in field collections, with no third-party rights assigned,
- passport data of potato *in vitro* collection

Additional data available in EURISCO:

- evaluation data for *Triticum durum* (durum wheat)
- evaluation data for *xTriticosecale* (triticale).

IE4 – Please provide any other information on information exchange that is important for others to know.

n.a.

IE5 – Describe the kind of information you distribute together with the germplasm to persons that request germplasm.

Please consider the following data types: Passport, Characterization; Evaluation, and/or Germplasm management data (e.g. viability percentage; protocols followed for routine operations; etc.

We do not distribute any information together with the germplasm unless requested. All passport data, evaluation data, photographs and documents attached to accessions are publicly available at https://wyszukiwarka.ihar.edu.pl/en/.
When it comes to germplasm management data, it is a part of internal database, but viability data can be shared as Excel files when requested. Protocols are not the part of digital information system.